Heat Transfer Characteristics of Car Radiator using TriHybrid Nanocoolant

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Abstract:
The use of nanoparticle coolant fluid in the car radiator increases the rate of heat transfer and facilitates the reduction of the overall radiator size. In this study, heat transfer characteristics of Al2O3-TiO2-SiO2 nanofluids-based Water/Ethylene Glycol were analyzed experimental and compared with Water/Ethylene Glycol mixture. Four different nanofluids concentrations were prepared by adding 0.05 to 0.3 vol.% of tri-hybrid nanofluid nanoparticles dispersed a mixture of water/ethylene glycol (60:40). Experiments were carried out by varying the flow rate of coolant between 2 to 12 LPM for working temperature of 70 °C, the velocity of airflow remained at an average of 4 m/s, to understand the effect of coolant flow rate on heat transfer. The results showed that the heat transfer coefficient of Al2O3-TiO2-SiO2 nanofluids or tri-hybrid nanofluids increased with increasing volume concentrations and temperatures. The maximum enhancement of the heat transfer coefficient for coolant side is observed at 39.7% at 0.3% volume concentration. The pressure drop and pumping power have the same pattern which increasing in volume concentrations, the pressure drop and pumping power will increase due to the concentration of the nanofluids. The correlation is applicable for water/EG (60:40) mixture and Al2O3-TiO2-SiO2 nanofluids with volume concentrations of 0.05 to 0.3% at 70 °C working temperature.

Keywords: Water/Ethylene Glycol; Hybrid Nanofluids; Tri-Hybrid Nanofluid

ACKNOWLEDGMENT

The authors are grateful to the Ministry of Education Malaysia and Universiti Malaysia Pahang (www.ump.edu.my) for financial supports given under FRGS/1/2018/TK10/UMP/02/10 and RDU190146. The authors also thank the research team from Automotive Engineering Centre (AEC), Centre of Excellence for Advanced Research in Fluid Flow (CARIFF) and Advanced Automotive Liquids Laboratory (AALL), who provided insight and expertise that greatly assisted in the present research work.